

METHOD AND APPARATUS FOR MODIFYING RELOCATABLE
OBJECT CODE FILES AND MONITORING PROGRAMS

ABSTRACT OF THE DISCLOSURE

5 An object code expansion program inserts new instructions and data between preexisting instructions and data of an object code file; offsets are modified to reflect new positions of the preexisting instructions and data. For each item of preexisting object code (instructions or data), the
10 following steps are performed: making a new code block comprising any desired new instructions and the item, and storing it as new object code; tracking the location of the item and the new code block within the new object code; and tracking items that contain inter-item offsets. Then, each
15 inter-item offset is updated using the new location of the item or new code block, as required. Finally, offsets in symbol tables and relocation structures are updated with the new location of the item.

 This expansion program is used to add instructions to
20 object code files of a second program, to monitor substantially all of the memory accesses of the second program. The added instructions establish and maintain a memory status array with entries for memory locations that are validly accessible by the second program; entries indicate the status of corresponding
25 memory locations. The memory status array is used to check for the errors of writing to unallocated memory and reading from unallocated or uninitialized memory. Also, the data section of the object code files are expanded with extra dummy entries to aid in the detection of array bounds violations and similar
30 data errors. Furthermore, watchpoints can be established for more comprehensive monitoring.